WHAT IS CLAIMED IS:

1. A radio network comprising:

at least one core node connected to a wired network;

relay nodes, each of the relay nodes relaying at least one of a down-link data packet initially transmitted from the core node, and an up-link data packet directed toward the core node; and

a terminal station, the terminal station transmitting and receiving at least one data packet to/from the core node and the relay nodes, wherein the relay nodes select a minimum total path loss between relay nodes included in a relay route of the data packet or between the relay nodes and the core node.

2. A radio network comprising:

at least one core node connected to a wired network;

relay nodes, each of the relay nodes relaying at least one of a down-link data packet transmitted from the core node and an up-link data packet directed toward the core node;

a terminal station transmitting and receiving at least one data packet to/from the core node and at least one relay node, the at least one relay node relaying the up-link data packet to at least one other up-link relay node and the core node when the up-link data packet addressed to an own node is received, and relaying a down-link data packet to at least one down-link relay node when the down-link data packet address to the own node is received.

3. A radio network as set forth in claim 2, wherein the at least one core node transmits a route setting packet, said route setting packet includes:

sender node identification information;

an up-link receiver side relay node; and

a metric indicative of an amount providing criteria for selecting the up-link receiver side node,

wherein the at least one relay node sets a sum of metrics contained in the route setting packet and a path loss between a node transmitting the route setting packet and a node receiving the route setting packet as an update metric, when the currently obtained update metric is smaller than any of update metrics corresponding to route setting packets received in the past,

wherein the at least one relay node relays a new route setting packet containing the currently obtained update metric as new metrics to at least one other relay node or one core node, sender node information indicative of the currently obtained route setting packet set in the up-link receiver side relay node of own node, and information of the receiver side relay node in an up-link receiver side node information.

4. A radio network as set forth in claim 2, wherein the at least one core node transmits a route setting packet including sender node identification information, an up-link receiver side relay node and a metric indicative of an amount providing criteria for selecting the receiver side node, and

the at least one relay node uses a weighting coefficient having a value in a range between zero and one upon updating the metric when the route setting packet is received, and decides a new update metric calculated by adding the metric contained in the route setting packet multiplied by the weighting coefficient and the metric to be newly added multiplied by the weighting coefficient and the metric to be newly added multiplied by a value calculated by subtracting the weighting coefficient from one.

5. A radio network as set forth in claim 4, wherein the metric contained in the route setting packet to be received by the at least one relay node contains a

metric generated using a path loss and a metric generated based on a hop count indicating a number of relay nodes included in the relay route.

6. A radio network as set forth in claim 5, wherein upon reception of the route setting packet, the at least one relay node updates the first metric using a first weighting coefficient, updates the second metric using a second weighting coefficient among a metric contained in the route setting packet and relays a new route setting packet determined by taking the first and second update metrics as a new metric corresponding to the currently received route setting packet when the first update metric is smaller than any of the first update metrics received in the past, and when the first update metric is the same as the minimum value of the first update metric corresponding to the route setting packet received in the past, and all of the second update metrics corresponding to the route setting packet received in the past and having the minimum first update metric are greater than the second update metric corresponding to the route setting packet currently received, the sender node information indicated by the route setting packet is set as an up-link receiver side relay node, and the up-link receiver side relay node information set in the up-link receiver side relay node information contained in the new route setting packet.

7. A radio network as set forth in claim 6, wherein the first metric is generated using the hop count and the second metric is generated using the path loss.

8. A radio network as set forth in claim 6, wherein, upon making judgment of large and small of the two kinds of metrics, metrics falling within a predetermined range are judged as the same metric.

9. A radio network as set forth in claim 6, wherein, upon updating the metric, 0.5 is used as the first weighting coefficient and 0.5 is used as the second weighting coefficient.

10. A radio network as set forth in claim 6, wherein, upon updating the metric, 0 is used as the second weighting coefficient.

11. A radio network comprising:

a relay node which forgets all update metrics corresponding to the route setting packets received in the past when a sender node identification information contained in the received route setting packet matches a current up-link receiver side relay node of own node, the relay node relays a new route setting packet comprising the update metric corresponding to the currently received route setting packet as a new metric.

12. A radio network as set forth in claim 3, wherein, after updating the metric contained in the received route setting packet, the sender node of the minimum metric among update metrics stored in the past, including the currently updated update metric, is determined, and a new route setting packet taking the update metric corresponding to the determined sender node as a new metric is relayed to at least one other relay node when the sender node does not match with at least the current up-link receiver side relay node of the own node.

13. A radio network as set forth in claim 7, wherein, after updating the metric contained in the received route setting packet, sender nodes having the first metric to be the minimum metric among update metrics stored, are selected and the sender node having the second metric to be minimum metric among the update metrics for the selected sender nodes is decided, and a new route setting packet taking the update metric corresponding to the determined sender node as new metrics, is relayed to other relay node when the sender node does not match with at least the current up-link receiver side relay node of own node.

14. A radio network as set forth in claim 3, wherein the at least one relay node makes reference to the up-link receiver side relay node information contained in the route setting packet upon receiving the route setting packet, and records information of the node which transmitted the route setting packet in a relay node list when the up-link receiver side node information indicates the own node.

15. A radio network as set forth in claim 3, wherein the at least one core node makes reference to the up-link receiver side relay node information contained in the route setting packet upon receiving the route setting packet, and records information of the node which transmitted the route setting packet in a relay node list when the up-link receiver side node information indicates the own node.

16. A radio network as set forth in claim 14, wherein information relating to update metrics corresponding to the route setting packets received in the past are erased after expiration of a predetermined time period.

17. A radio network as set forth in claim 14, wherein the at least one core node sets the metric contained in the route setting packet to zero.

18. A radio network as set forth in claim 14, wherein the path loss is predicted from a reception power of the received route setting packet.

19. A radio network as set forth in claim 14, wherein the relay node transmits the up-link data packet to the up-link receiver side relay node upon reception of the up-link data packet that is transmitted from one of the terminal station and other relay nodes.

20. A radio network as set forth in claim 19, wherein each relay node stores the sender side relay information contained in the up-link date packet transmitted to the own node in the relay node list.

21. A radio network as set forth in claim 14, wherein the at least one relay node relays a down-link data packet to at least one of the nodes contained in the relay node list upon relaying the down-link data packet.

22. A radio network as set forth in claim 21, wherein the information of the nodes contained in the relay node list is erased after expiration of a predetermined time period.

23. A radio network as set forth in claim 21, wherein the down-link data packet contains the terminal station information, the terminal station performs a reception process of the down-link data packet when the terminal station information identifies the own station as checking the terminal station information contained in the down-link data packet transmitted from the adjacent relay node.

24. A radio network as set forth in claim 21, wherein the at least one relay node selects an up-link data packet having a higher reception quality when the up-link data packet is received from a plurality of sender side relay nodes for relaying.

25. A radio network as set forth in claim 21, wherein the at least one core node selects the up-link data packet having a higher reception quality when the up-link data packet is received from a plurality of sender side relay nodes for relaying.

26. A radio network as set forth in claim 21, wherein one of the relay nodes and the at least one core node perform maximal ratio combining reception upon receiving identical up-link data packets from a plurality of sender side relay nodes.

27. A radio network as set forth in claim 3, wherein the route setting packet is transmitted at a constant transmission power in all of the relay nodes and the at least one core node.

28. A radio network as set forth in claim 3, wherein the up-link data packet is controlled by the transmission power for constant reception power or constant reception quality in at least one of the relay nodes and the reception side relay node.

29. A radio network as set forth in claim 3, wherein the down-link data packet is controlled by the transmission power for one of the constant reception power or constant reception quality in the relay node and reception side relay node.

30. A radio network as set forth in claim 1, wherein a radio frequency band to be used in relaying between the core node and the relay node, and between the relay nodes and a radio frequency band, to be used in access transmission between the core node and the terminal station, and between the relay node and the terminal station, are different, and the radio frequency band to be used in relaying is higher than the radio frequency band to be used in the access transmission.

31. A radio network as set forth in claim 1, wherein each of the core node and the relay node has a plurality of directional antennas, each of the plurality of directional antennas is variable of transmitting direction, each node controls transmitting direction of the directional antennas toward one of the core node and the relay node located adjacent to the node.

32. A radio network as set forth in claim 31, wherein one of the core node and the relay node uses a non-directional antenna upon transmission of the route setting packet, and uses the directional antenna upon relaying of the data packet.

33. A radio network comprising:

at least one core node connected to a wired network;

relay nodes, each of the relay nodes relaying at least one of a down-link data packet transmitted from the at least one core node and an up-link data packet directed toward the at least one core node;

a terminal station capable of transmission and reception of data packet with both of the at least one core node and the relay nodes, a radio frequency band to be used in relaying to be performed between the at least one core node and the relay nodes and between the relay nodes and a radio frequency band to be used in access transmission to be performed between the at least one core node and the terminal station and between the relay node and the terminal station, are different, and the radio frequency band to be used in relaying is higher than the radio frequency band to be used in the access transmission.

34. A radio network as set forth in claim 33, wherein each of the at least one core node and the relay nodes has a plurality of directional antennas, each of the plurality of directional antenna is variable of transmitting direction,

each node controls transmitting direction of the their own directional antennas toward one of the at least one core node and the relay nodes located adjacent to the node.

35. A radio network as set forth in claim 34, wherein one of the at least one core node andthe relay nodes uses a non-directional antenna upon transmission of the route setting packet, and uses the directional antennas upon relaying of the data packet.

36. A relay node relaying at least one of a down-link data packet initially transmitted from a core node and an up-link data packet directed toward the core node, and capable of communication with a terminal station, comprising:

antennas for access transmission;

antennas for relaying;

a radio system for access transmission; and

a radio system for relaying, a first radio frequency band to be used in relaying to communicate with the core node or another relay mode and a second radio frequency band to be used in access transmission to communicate with the terminal station, are different, and a radio frequency band to be used in relaying is higher than a radio frequency band to be used in the access transmission.

37. A relay node relaying at least one of a down-link data packet initially transmitted from a core node and an up-link data packet directed toward the core node, and capable of communication with a terminal station, selecting a relay node for making a total path loss in a relay route of a data packet minimum from own node to the core node.

38. A relay node relaying at least one of a down-link data packet initially transmitted from a core node and an up-link data packet directed toward the core node, and capable of communication with a terminal station, relaying the up-link data packet to one of an up-link relay node and the core node when the up-link data packet addressed to an own node is received and relaying a down-link data packet to at least one down-link relay node when the down-link data packet address to the own node is received.

39. A relay node as set forth in claim 38, wherein a route setting packet, including a sender node identification information, an up-link receiver side relay node and a metric indicative of an amount providing criteria for selecting the up-link receiver side node from at least one of the core node and an other relay node, the relay node sets a sum of a metric contained in the route setting packet and a path loss between a node that transmitted the route setting packet and a node receiving the route setting packet as an update metric, when the currently obtained update metric is

smaller than any update metric corresponding to route setting packets received in the past, a new route setting packet containing the currently obtained update metric as a new metric is relayed to other relay nodes, a sender node information indicative of the currently obtained route setting packet is set in the up-link receiver side relay node of own node, and information of the receiver side relay node is set in an up-link receiver side node information contained in new route setting packet.

40. A relay node as set forth in claim 38, wherein a route setting packet including a sender node identification information, an up-link receiver side relay node and a metric indicative of an amount providing criteria for selecting the receiver side node from one of the core node and an other relay node, the relay node uses a weighting coefficient having a value in a range between zero and one upon updating of the metric when the route setting packet is received, and decides a new update metric calculated by adding the metric contained in the route setting packet multiplied by the weighting coefficient and the metric to be newly added multiplied by a value calculated by subtracting the weighting coefficient from one.

41. A relay node as set forth in claim 40, wherein the metric contained in the route setting packet to be received by an own node contains a metric generated based on a path loss and a metric generated based on a hop count indicating a number of relay nodes included in the relay route.

42. A relay node as set forth in claim 41, which updates a first metric using a first weighting coefficient and updates a second metric using a second weighting coefficient among a metric contained in the route setting packet upon reception of the route setting packet, relays a new route setting packet to take the first and second update metrics as a new metric corresponding to the currently received route setting packet when the first update metric is smaller than any of the update metrics received in the past or when the first update metric is the same as the

minimum value of an update metric corresponding to the route setting packet received in the past and all update metrics corresponding to the route setting packet received in the past and having the minimum first update metric are greater than the second update metric corresponding to the route setting packet currently received, the sender node information indicated by the route setting packet is set as an up-link receiver side relay node, and the up-link receiver side relay node information set in the up-link receiver side relay node information contained in the new route setting packet.

43. A relay node as set forth in claim 42, wherein the first metric is generated on the basis of the hop count and the second metric is generated on the basis of the path loss.

44. A relay node as set forth in claim 42, wherein, upon making judgment of large and small of the two kinds of metrics, metrics within a predetermined range are judged to be the same metric.

45. A relay node as set forth in claim 42, wherein, upon updating the metric, 0.5 is used as the first weighting coefficient and 0.5 is used as the second weighting coefficient.

46. A relay node as set forth in claim 42, wherein, upon updating the metric, 0 is used as the second weighting coefficient.

47. A relay node as set forth in claim 39, which forgets all update metrics corresponding to the route setting packets received in the past and relays a new route setting packet taking the update metric corresponding to the currently received route setting packet as a new metric, when a sender node identification information contained in the received route setting packet matches a current up-link receiver side relay node of own node.

48. A relay node as set forth in claim 39, wherein, after updating the metric contained in the received route setting packet, the sender node of the minimum metric among update metrics stored in the past, including the currently updated update metric, is determined, and a new route setting packet taking the update metric corresponding to the determined sender node as a new metric, is relayed to other relay node when the sender node does not match with at least the current up-link receiver side relay node of own node.

49. A relay node as set forth in claim 43, wherein, after updating the metric contained in the received route setting packet, sender nodes having the first metric to be the minimum metric among update metrics stored are selected, the sender node having the second metric to be minimum metric among the update metrics for the selected sender nodes is decided, and a new route setting packet taking the update metric corresponding to the determined sender node as new metric is relayed to other relay node when the sender node does not match with at least the current up-link receiver side relay node of own node.

50. A relay node as set forth in claim 39, wherein the relay node makes reference to the up-link receiver side relay node information contained in the route setting packet upon receiving the route setting packet, and the relay node records information of the node that transmitted the route setting packet in a relay node list when the up-link receiver side node information indicates the own node.

51. A relay node as set forth in claim 50, wherein information relating to update metrics corresponding to the route setting packets received in the past are erased after expiration of a given time period.

52. A relay node as set forth in claim 50, wherein the path loss is predicted from a reception power of the route setting packet received by the relay node.

53. A relay node as set forth in claim 50, wherein the relay node transmits the up-link data packet to the up-link receiver side relay node upon reception of the up-link data packet transmitted from one of the terminal station and other relay node.

54. A relay node as set forth in claim 53, wherein each relay node stores the sender side relay information contained in the up-link data packet transmitted to the own node in its relay node list.

55. A relay node as set forth in claim 50, wherein the relay node relays a down-link data packet to at least a part of nodes contained in the relay node list upon relaying the down-link data packet.

56. A relay node as set forth in claim 55, wherein the information of the nodes contained in the relay node list is erased after expiration of the predetermined time period.

57. A relay node as set forth in claim 55, wherein the down-link data packet contains the terminal station information, the terminal station performs reception process of the down-link data packet when the terminal station information identifies the own station as checking the terminal station information contained in the down-link data packet transmitted from the adjacent relay node.

58. A relay node as set forth in claim 56, wherein the relay node selects an up-link data packet having a higher reception quality when theup-link data packet is received from a plurality of sender side relay nodes, for relaying.

59. A relay node as set forth in claim 55, the relay node performs maximal ratio combining reception upon receiving the same up-link data packets from a plurality of the sender side relay nodes.

60. A relay node as set forth in claim 39, wherein the route setting packet is transmitted at a constant transmission power in all of the relay nodes and the core node.

61. A relay node as set forth in claim 39, wherein the up-link data packet is controlled by the transmission power for at least one of constant reception power and constant reception quality in at least one of the relay node and the reception side relay node.

62. A relay node as set forth in claim 39, wherein the down-link data packet is controlled by the transmission power for at least one of constant reception power and constant reception quality in at least one of the relay node and the reception side relay node.

63. A relay node as set forth in claim 37, wherein a radio frequency band for relaying between the core node and the relay node, and between the relay nodes, and a radio frequency band to be used for access transmission between the core node and the terminal station, and between the relay node and the terminal station, are different, and the radio frequency band for relaying is higher than the radio frequency band for access transmission.

64. A relay node as set forth in claim 37, wherein each of the core node and the relay node has a plurality of directional antenna, each of the plurality of directional antenna is variable of transmitting direction, each node controls

transmitting direction of the directional antennas toward either of the core node and the relay node located adjacent tothe node.

65. A relay node as set forth in claim 64, the relay node uses a non-directional antenna for transmission of the route setting packet, and uses the directional antenna for relaying the data packet.

66. A relay node relaying at least one of a down-link data packet transmitted from the core node and an up-link data packet directed toward the core node, and the relay node is capable of communication with a terminal station, a radio frequency band to be used for relaying between the core node and the relay node and between the relay nodes, and a radio frequency band for access transmission between the core node and the terminal station, and between the relay node and the terminal station, are different, and the radio frequency band for relaying is higher than the radio frequency band for access transmission.

67. A relay node as set forth in claim 66, wherein each of the core node and the relay node has a plurality of directional antenna, each of the plurality of directional antenna is variable of transmitting direction, each node controls transmitting direction of the directional antennas toward either of the core node and the relay node located adjacent to the node.

68. A relay node as set forth in claim 67, the relay node uses a non-directional antenna upon transmission of the route setting packet, and uses the directional antennas upon relaying of the data packet.

69. A core node capable of transmission and reception of a data packet with either a relay node that performs radio relaying and a terminal station, and connected to a wired network, comprising:

antennas for access transmission;

antennas for relaying;

a radio system for access transmission;

a radio system for relaying; and

a signal distributor connected to a wired backbone network, a radio frequency band for relaying to communicate with the relay node and a radio frequency band for access transmission to communicate with the terminal station, are different, and the radio frequency band for relaying is higher than the radio frequency for access transmission.

70. A core node connected to a wired network, being relayed at least one of a down-link data packet transmitted from an own node and an up-link data packet directed toward own node, and capable of transmission and reception of a data packet with a terminal station, and transmitting a route setting packet including a metric indicative of an amount providing criteria for selecting an up-link receiver side relay node, an up-link receiver side relay node information and a receiver side relay node to the relay node.

71. A core node as set forth in claim 70, wherein the metric contained in the route setting packet is set to zero.

72. A core node as set forth in claim 70, wherein the metric contained in the route setting packet to be received by the own node contains a metric generated based on a path loss and a metric generated based on hop count indicating a number of relay nodes included in the relay route.

73. A radio network as set forth in claim 70, wherein the up-link receiver side relay node information contained in the route setting packet is made reference to upon receiving the route setting packet, and records information of the node that

transmitted the route setting packet in a relay node list when the up-link receiver side node information indicates the own node.

74. A core node as set forth in claim 73, wherein the information of the nodes contained in the relay node list is erased after expiration of a predetermined time period.

75. A core node as set forth in claim 70, the core node selects the up-link data packet having a higher reception quality when the same up-link data packet is received from a plurality of sender side relay nodes for relaying.

76. A core node as set forth in claim 70, wherein at least one of the relay node and the core node performs maximal ratio combining reception upon receiving the same up-link data packets from a plurality of the sender side relay nodes.

77. A core node as set forth in claim 70, wherein the route setting packet is transmitted at a constant transmission power in all of the relay nodes and the core nodes.

78. A core node as set forth in claim 70, wherein the down-link data packet is controlled by the transmission power for at least one of constant reception power and constant reception quality in at least one of the relay node and the reception side relay node.

79. A core node as set forth in claim 70, wherein a radio frequency band for relaying to communicate with the relay node and a radio frequency band for access transmission to communicate with the terminal stationare different, and the radio frequency band for relaying is higher than the radio frequency for access transmission.

80. A core node as set forth in claim 70, the core node has a plurality of directional antennas,

each of the plurality of directional antennas is variable of transmitting direction,and controls transmitting direction of the directional antennas of their own toward either of the relay nodes located adjacent to the node.

81. A core node as set forth in claim 80, which the core node uses a non-directional antenna upon transmission of the route setting packet, and uses the directional antenna upon relaying of the data packet.

82. A core node connected to a wired network, the core node being relayed at least one of a down-link data packet transmitted from an own node and an up-link data packet directed toward the own node, and capable of transmission and reception of a data packet with a terminal station, a radio frequency band for relaying to communicate with the relay node and a radio frequency band for access transmission to communicate with the terminal station, are different, and the radio frequency band for access transmission.

83. A core node as set forth in claim 82, the core node has a plurality of directional antennas, each of the plurality of directional antennas is variable of transmitting direction, and controls transmitting direction of the directional antennas toward either of the relay node located adjacent.

84. A core node as set forth in claim 83, the core node uses a non-directional antenna upon transmission of the route setting packet, and uses the directional antennas upon relaying of the data packet.

85. A relaying method for a radio network including:

a core node connected to a wired network;

relay nodes each relaying at least one of a down-link data packet transmitted from the core node and an up-link data packet directed toward the core node; and

a terminal station capable of transmission and reception of data packet with both of the core node and the relay node, comprising the step of selecting the relay node having total transmission loss to be minimum at least one of between relay nodes includes in a relay route of the data packet and between the relay node and the core node.

86. A relaying method for a radio network including a core node connected to a wired network, relay nodes each relaying at least one of a down-link data packet transmitted from the core node and an up-link data packet directed toward the core node, and a terminal station capable of transmission and reception of a data packet with both of the core node and the relay node, comprising step of relaying the up-link data packet to other one of up-link relay node and the core node when the up-link data packet addressed to own node is received and relaying a down-link data packet to at least one down-link relay node when the down-link data packet address to the own node is received.

87. A relaying method as set forth in claim 86, wherein the core node transmits a route setting packet including a sender node identification information, an up-link receiver side relay node and a metric indicative of an amount providing an indicia for selecting the receiver side node, the relay node sets a sum of a metric contained in the route setting packet and a transmission loss between a node transmitting the route setting packet and a node receiving the route setting packet as an update metric, when the currently obtained update metric is smaller than any update metric corresponding to route setting packets received in the past, a new route setting packet containing the currently obtained update metric as a new metric is relayed to other relay node, a sender node information indicative of the currently obtained route setting packet is set in the up-link receiver side relay node, and information of the

receiver side relay node is set in an up-link receiver side node information contained in new route setting packet.

88. A relaying method as set forth in claim 86, wherein the core node transmits a route setting packet including a sender node identification information, an up-link receiver side relay node and a metric indicative of an amount providing an indicia for selecting the receiver side node,

the relay node uses a weighting coefficient having a value within a range of zero and one upon updating of the metric when the route setting packet is received, multiplies the weighting coefficient with the metric contained in the route setting packet, multiplies the metric to be added by a value calculated by subtracting the weighting coefficient from one and adding products from both multiplications to set a resultant value as an update metric.

89. A relaying method as set forth in claim 88, wherein the metric contained in the route setting packet to be received by the relay node contains a metric generated based on a path loss and a metric generated based on a hop number indicating a number of relay nodes included in the relay route.

90. A relaying method as set forth in claim 89, wherein the relay node updates the first metric using a first weighting coefficient, and updates the second metric using a second weighting coefficient among metrics contained in the route setting packet upon a reception of the route setting packet, relays a new route setting packet to take the first and second update metrics as a new metric corresponding to the currently received route setting packet, when the first update metric is smaller than any of the first update metrics received in the past and when the first update metric is the same as the minimum value of the first update metric corresponding to the route setting packet received in the past and all of the second update metric corresponding to the route setting packet received in the past and having the minimum first update

metric, are greater than the second update metric corresponding to the route setting packet currently received, the sender node information, indicated by the route setting packet, is set in the up-link receiver side relay node, and the receiver side relay node information thus set us set in the up-link receiver side relay node information contained in the new route setting packet.

91. A relaying method as set forth in claim 90, wherein the first metric is generated on the basis of the hop number and the second metric is generated on the basis of the path loss.

92. A relaying method as set forth in claim 90, wherein, upon making judgment of large and small of the two kinds of metrics, metrics that fall within a predetermined range are judged as the same metric.

93. A relaying method as set forth in claim 90, wherein, upon updating the metric, 0.5 is used as a first weighting coefficient and 0.5 is used as a second weighting coefficient.

94. A relaying method as set forth in claim 90, wherein, upon updating the metric, 0 is used as a second weighting coefficient.

95. A relaying method comprising: a relay node which forgets all of update metrics corresponding to the route setting packets received in the past and relays a new route setting packet taking the update metric corresponding to the currently received route setting packet as a new metric, when a sender node identification information contained in the received route setting packet matches a current up-link receiver side relay node.

96. A relaying method as set forth in claim 87, wherein, after updating the metric contained in the received route setting packet, the sender node of the

minimum metric among update metrics stored in the past including the currently updated update metric is determined, and a new route setting packet taking the update metric corresponding to the determined sender core as a new metric, is relayed to other relay node when the sender node does not match with at least the current up-link receiver side relay node.

97. A relaying method as set forth in claim 91, wherein, after updating the metric contained in the received route setting packet, the sender node having the first metric to be the minimum metric among update metrics stored, is selected, the sender node having the second metric to be a minimum metric amongthe update metrics for the selected sender node and a new route setting packet taking the update metric corresponding to the determined sender core as a new metric, is relayed to other relay node when the sender node does not match with at least the current up-link receiver side relay node.

98. A relaying method as set forth in claim 87, wherein the relay node makes reference to the up-link receiver side relay node information contained in the route setting packet upon receiving the route setting packet for recording information of the node that transmitted the route setting packet in a relay node list when the up-link receiver side node information indicates the own node.

99. A relaying method as set forth in claim 87, wherein the core node makes reference to the up-link receiver side relay node information contained in the route setting packet upon receiving the route setting packet for recording information of the node transmitted the route setting packet in a relay node list when the up-link receiver side node information indicates own node.

100. A relaying method as set forth in claim 98, wherein information relating to update metrics corresponding to the route setting packets received in the past are erased after expiration of a given time period

101. A relaying method as set forth in claim 98, wherein the core node sets the metric contained in the route setting packet to zero.

102. A relaying method as set forth in claim 98, wherein the transmission loss is predicted from a reception power of the received route setting packet.

103. A relaying method as set forth in claim 98, wherein the relay node transmits the up-link data packet to the up-link receiver side relay node upon reception of the up-link data packet transmitted from one of the terminal station and other relay node.

104. A relaying method as set forth in claim 103, wherein each relay node stores the receiver side relay information contained in the up-link packet transmitted to the own node.

105. A relaying method as set forth in claim 98, wherein the relay node relays a down-link data packet to at least a part of nodes contained in the relay node list upon relaying the down-link data packet.

106. A relaying method as set forth in claim 105, wherein the information of the nodes contained in the relay node list is erased after expiration of the predetermined period.

107. A relaying method as set forth in claim 105, wherein the down-link data packet contains the terminal station information, the terminal station performs reception process of the down-link data packet when the terminal station information

identifies the own station as checking the terminal station information contained in the down-link data packet transmitted from the adjacent relay node.

108. A relaying method as set forth in claim 105, wherein the relay node selects an up-link data packet having a higher reception quality when the same up-link data packet is received from a plurality of sender side relay nodesfor relaying.

109. A relaying method as set forth in claim 105, wherein the core node selects an up-link data packet having a higher reception quality when the same up-link data packet is received from a plurality of sender side relay nodes for relaying.

110. A relaying method as set forth in claim 105, wherein at least one of the relay node and the core node performs maximum ratio combined reception upon receiving the same up-link data packets from a plurality of the sender side relay nodes.

111. A relaying method as set forth in claim 87, wherein the route setting packet is transmitted at a constant transmission power in all of the relay nodes and the core nodes.

112. A relaying method as set forth in claim 87, wherein the up-link data packet is controlled by the transmission power for at least one of constant reception power and constant reception quality in at least one of the relay node and the reception side relay node.

113. A relaying method as set forth in claim 87, wherein the down-link data packet is controlled by the transmission power for at least one of constant reception power and constant reception quality in at least one of the relay node and the reception side relay node.

114. A relaying method as set forth in claim 85, wherein a radio frequency band for relaying between the core node and the relay node and between

the relay nodes and a radio frequency band for access transmission between the core node and the terminal station and between the relay node and the terminal station, are different, and the radio frequency band for relaying is higher than the radio frequency band for access transmission.

115. A relaying method as set forth in claim 85, wherein each of the core node and the relay node has a plurality of directional antenna,

each of the plurality of directional antenna is variable of transmitting direction,

each node controls the transmitting direction of the directional antenna of their own node toward either of the core node and the relay node located adjacent to the node.

116. A relaying method as set forth in claim 115, wherein either of the core node and the relay node uses a non-directional antenna upon transmission of the route setting packet, and uses the directional antenna upon relaying of the data packet.

117. A relaying method for a system including a core node connected to a wired network, relay nodes each relaying at least one of a down-link data packet transmitted from the core node and an up-link data packet directed toward the core node, and a terminal station capable of transmission and reception of data packet with both of the core node and the relay node,

a radio frequency band for relaying between the core node and the relay node and between the relay nodes, and a radio frequency band for access transmission between the core node and the terminal station and between the relay node and the terminal station, being different, and the radio frequency band for relaying is higher than the radio frequency band for access transmission.

118. A relaying method as set forth in claim 117, wherein each of the core node and the relay node has a plurality of directional antenna, each of the plurality of directional antenna is variable of transmitting direction, each node controls transmitting direction of the directional antenna their own toward either of the core node and the relay node located adjacent to the node.

119. A relaying method as set forth in claim 118, wherein either of the core node and the relay node uses a non-directional antenna upon transmission of the route setting packet, and uses the directional antenna upon relaying of the data packet.

120. A relaying method for a radio network including at least one core node connected to a wired network, relay nodes each relaying at least one of a down-link data packet initially transmitted from the at least one core node and an up-link data packet directed toward the at least one core node, and a terminal station capable of transmission and reception of data packet with both of the at least one core node and the relay nodes, comprising:

step of detecting arrival of a route setting packet including a sender node identification information, an up-link receiver side relay node information and a metric indicative of an amount providing criteria for selecting an up-link receiver side relay node;

step of making judgment whether the up-link receiver side relay node indicates own node or not upon detection of arrival of the route setting packet;

step of recording a node indicated by the sender node identification information contained in the route setting packet in a relay node list when judgment is made that the up-link receiver side information indicates own node;

step of taking a measured path loss upon judgment that the up-link receiver side node relay node information does not indicative own node, as path loss

Ln (n is unique number of a sender node of the route setting packet) between the node transmitting the route setting packet and the own node;

step of reading the metric Mr,n contained in the route setting packet;

step of calculating and storing an update metric from the path loss Ln and the metric Mr,n;

step of comparing the update metric Mn with the update metric corresponding to the route setting packet received in the past for making judgment whether the update metric Mn is minimum;

step of setting the update metric Mn to a metric field contained in a new route setting packet and registering the node indicated by the sender node identification information of the currently arrived route setting packet as the up-link receiver side relay node of own node when the update metric Mn is judged as minimum; and

step of transmitting the new route setting packet containing the metric Mn as a new metric M, sender node identification information indicating identification information of own node and the up-link receiver side relay node information.

121. A relaying method for a radio network including at least one core node connected to a wired network, relay nodes each relaying at least one of a down-link data packet initially transmitted from the at least one core node and an up-link data packet directed toward the at least one core node, and a terminal station capable of transmission and reception of data packet with both of the at least one core node and the relay nodes, comprising:

step of detecting arrival of a route setting packet including a sender node identification information, an up-link receiver side relay node information and a metric indicative of an amount providing criteria for selecting the up-link receiver side relay node;

step of making judgment whether the up-link receiver side relay node indicates own node or not upon detection of arrival of the route setting packet;

step of recording a node indicated by the sender node identification information contained in the route setting packet in a relay node list when judgment is made that the up-link receiver side information indicates own node;

step of taking a measured path loss upon judgment that the up-link receiver side node relay node information does not indicative own node, as path loss Ln (n is unique number of a sender node of the route setting packet) between the node transmitting the route setting packet and the own node;

step of reading the metric Mr,n contained in the route setting packet;

step of calculating and storing an update metric from the path loss Ln and the metric Mr,n;

step of making judgment whether the sender node identification information contained in the currently received route setting packet matches with the current up-link receiver side relay node of the own node or not;

step of forgetting all stored update metrics when the sender node identification information contained in the currently received route setting packet matches with the current up-link receiver side relay node of the own node;

step of comparing the update metric corresponding to the route setting packet received in the past and the currently obtained update metric Mn when the sender node identification information contained in the currently received route setting packet does not match with the current up-link receiver side relay node of the own node;

step of setting the update metric Mn to a metric contained in a new route setting packet and registering the node indicated by the sender node identification information of the currently arrived route setting packet as the up-link receiver side relay node of the own node when all of the update metrics are forgotten or when the update metric Mn is judged as minimum; and

step of transmitting the new route setting packet containing the metric Mn as a new metric M, sender node identification information indicating identification information of the own node and the up-link receiver side relay node information.

122. A relaying method for a radio network including at least one core node connected to a wired network, relay nodes each relaying at least one of a down-link data packet initially transmitted from the at least one core node and an up-link data packet directed toward the at least one core node, and a terminal station capable of transmission and reception of a data packet with both of the at least one core node and the relay nodes, comprising:

step of detecting arrival of a route setting packet including a sender node identification information, an up-link receiver side relay node information and a metric indicative of an amount providing criteria for selecting an up-link receiver side relay node;

step of making judgment whether the up-link receiver side relay node indicates own node or not upon detection of arrival of the route setting packet;

step of recording a node indicated by the sender node identification information contained in the route setting packet in a relay node list when judgment is made that the up-link receiver side information indicates own node;

step of taking a measured path loss upon judgment that the up-link receiver side node relay node information does not indicate own node, as path loss Ln (n is unique number of a sender node of the route setting packet) between the node transmitting the route setting packet and the own node;

step of reading the metric Mr,n contained in the route setting packet;

step of calculating and storing an update metric from the path loss Ln and the metric Mr,n;

step of comparing the update metric Mn with the update metric corresponding to the route setting packet received in the past for determining a sender node m, is a unique node number, having a minimum metric;

step of making judgment whether the sender node m is the same as the current up-link receiver side relay node of own node and $n \neq m$;

step of setting the update metric Mn to a metric field contained in a new route setting packet and registering the node indicated by the sender node m as the up-link receiver side relay node of own node when the sender node m is not the same as the current up-link receiver side relay node of own node, $n = m$; and

step of transmitting the new route setting packet containing the metric Mn as a new metric M, sender node identification information indicating identification information of own node and the up-link receiver side relay node information of own node.

123. A program of a relaying method for a radio network including at least one core node connected to a wired network, relay nodes each relaying at least one of a down-link data packet initially transmitted from the core node and an up-link data packet directed toward the at least one core node, and a terminal station capable of transmission and reception of data packet with both of the at least one core node and the relay node, the program being executed by a computer for implementing the step of:

selecting the relay node having total path loss to be minimum at least one of between relay nodes includes in a relay route of the data packet and between the relay node and the at least one core node.

124. A program of a relaying method for a radio network including at least one core node connected to a wired network, relay nodes each relaying at least one of a down-link data packet initially transmitted from the at least one core node and

an up-link data packet directed toward the at least one core node, and a terminal station capable of transmission and reception of data packet with both of the core node and the relay node, the program being executed by a computer for implementing the step of:

relaying the up-link data packet to other one of up-link relay node and the at least one core node when the up-link data packet addressed to own node and relaying a down-link data packet to at least one down-link relay node when the down-link data packet address to the own node is received.

125. A program of a relaying method for a radio network including a core node connected to a wired network, relay nodes each relaying at least one of a down-link data packet transmitted from the core node and an up-link data packet directed toward the core node, and a terminal station capable of transmission and reception of data packet with both of the core node and the relay node, the program being executed by a computer for implementing the step of:

step of detecting arrival of a route setting packet including a sender node identification information, an up-link receiver side relay node information and a metric indicative of an amount providing an indicia for selecting the receiver side relay node;

step of making judgment whether the up-link receiver side relay node indicates own node upon detection of arrival of the route setting packet;

step of recording a node indicated by the sender node identification information contained in the route setting packet in a relay node list when judgment is made that the up-link receiver side information indicates the own node;

step of taking a measured path loss upon judgment that the up-link receiver side node relay node information does not indicative own node, as path loss Ln, is unique number of a sender node of the route setting packet, between the node transmitting the route setting packet and the own node;

step of reading the metric Mr,n contained in the route setting packet;

step of calculating and storing an update metric from the transmission loss Ln and the metric Mr,n;

step of comparing the update metric Mn with the update metric corresponding to the route setting packet received in the past for making judgment whether the update metric Mn is minimum;

step of setting the update metric Mn to a metric contained in the metric of the route setting packet and registering the node indicated by the sender node identification information of the currently arrived route setting packet as the up-link receiver side relay node when the update metric Mn is judged as minimum; and

step of transmitting a route setting packet containing the transmission metric M as the metric, sender node identification information indicating identification information of own node and the up-link receiver side relay node information.

126. A program of a relaying method for a radio network including a core node connected to a wired network, relay nodes each relaying at least one of a down-link data packet transmitted from he core node and an up-link data packet directed toward the core node, and a terminal station capable of transmission and reception of data packet with both of the core node and the relay node, the program being executed by a computer for implementing the step of:

step of detecting arrival of a route setting packet including a sender node identification information, an up-link receiver side relay node information and a metric indicative of an amount providing an indicia for selecting the receiver side relay node;

step of making judgment whether the up-link receiver side relay node indicates own node upon detection of arrival of the route setting packet;

step of recording a node indicated by the sender node identification information contained in the route setting packet in a relay node list when judgment is made that the up-link receiver side information indicates the own node;

step of taking a measured path loss upon judgment that the up-link receiver side node relay node information does not indicative own node, as path loss Ln , is unique number of a sender node of the route setting packet, between the node transmitting the route setting packet and the own node;

step of reading the metric Mr,n contained in the route setting packet;

step of calculating and storing an update metric from the transmission loss Ln and the metric Mr,n;

step of making judgment whether the sender node identification information contained in the currently received route setting packet matches with the current up-link receiver side relay node information or not;

step of forgetting all stored update metrics when the sender node identification information contained in the currently received route setting packet matches with the current up-link receiver side relay node information;

step of comparing the update metric corresponding to the route setting packet received in the past and the currently obtained update metric Mn when the sender node identification information contained in the currently received route setting packet does not match with the current up-link receiver side relay node information;

step of setting the update metric Mn to a metric contained in the metric of the route setting packet and registering the node indicated by the sender node identification information of the currently arrived route setting packet as the up-link receiver side relay node when all of the update metrics are forgotten or when the update metric Mn is judged as minimum; and

step of transmitting a route setting packet containing the transmission metric M as the metric, sender node identification information indicating identification information of own node and the up-link receiver side relay node information.

127. A program of a relaying method for a radio network including at least one core node connected to a wired network, relay nodes each relaying at least one of a down-link data packet transmitted from the at least one core node and an up-link data packet directed toward the at least one core node, and a terminal station capable of transmission and reception of data packet with both of the core node and the relay node, the program being executed by a computer for implementing the step of:

step of detecting arrival of a route setting packet including a sender node identification information, an up-link receiver side relay node information and a metric indicative of an amount providing an indicia for selecting the receiver side relay node;

step of making judgment whether the up-link receiver side relay node indicates own node upon detection of arrival of the route setting packet;

step of recording a node indicated by the sender node identification information contained in the route setting packet in a relay node list when judgment is made that the up-link receiver side information indicates the own node;

step of taking a measured path loss upon judgment that the up-link receiver side node relay node information does not indicative own node, as path loss Ln, n is unique number of a sender node of the route setting packet, between the node transmitting the route setting packet and the own node;

step of reading the metric Mr,n contained in the route setting packet;

step of calculating and storing an update metric from the transmission loss Ln and the metric Mr,n;

step of comparing the update metric Mn with the update metric corresponding to the route setting packet received in the past for determining a sender node m (m is unique number of node) having minimum metric;

step of making judgment whether the sender node m is the same as the current up-link receiver side relay node and n m;

step of setting the update metric Mn to a metric contained in the metric of the route setting packet and registering the node indicated by the sender node m as the up-link receiver side relay node when the sender node m is not the same as the current up-link receiver side relay node or n = m; and

step of transmitting a route setting packet containing the transmission metric M as the metric, sender node identification information indicating identification information of own node and the up-link receiver side relay node information.